Designing for All:
Making Data Visualizations More Accessible

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Data and Visualization Librarian

Data Services

JOHNS HOPKINS
SHERIDAN LIBRARIES

Designing for

Color deficiency

Low literacy

Neurodiversity

Low vision

Mobility impairments …

Accessibility Benefits

Everyone

Web Content Accessibility Guidelines

WCAG

Perceivable

Information must be presented in ways that users can perceive it with at least one of their senses

Operable

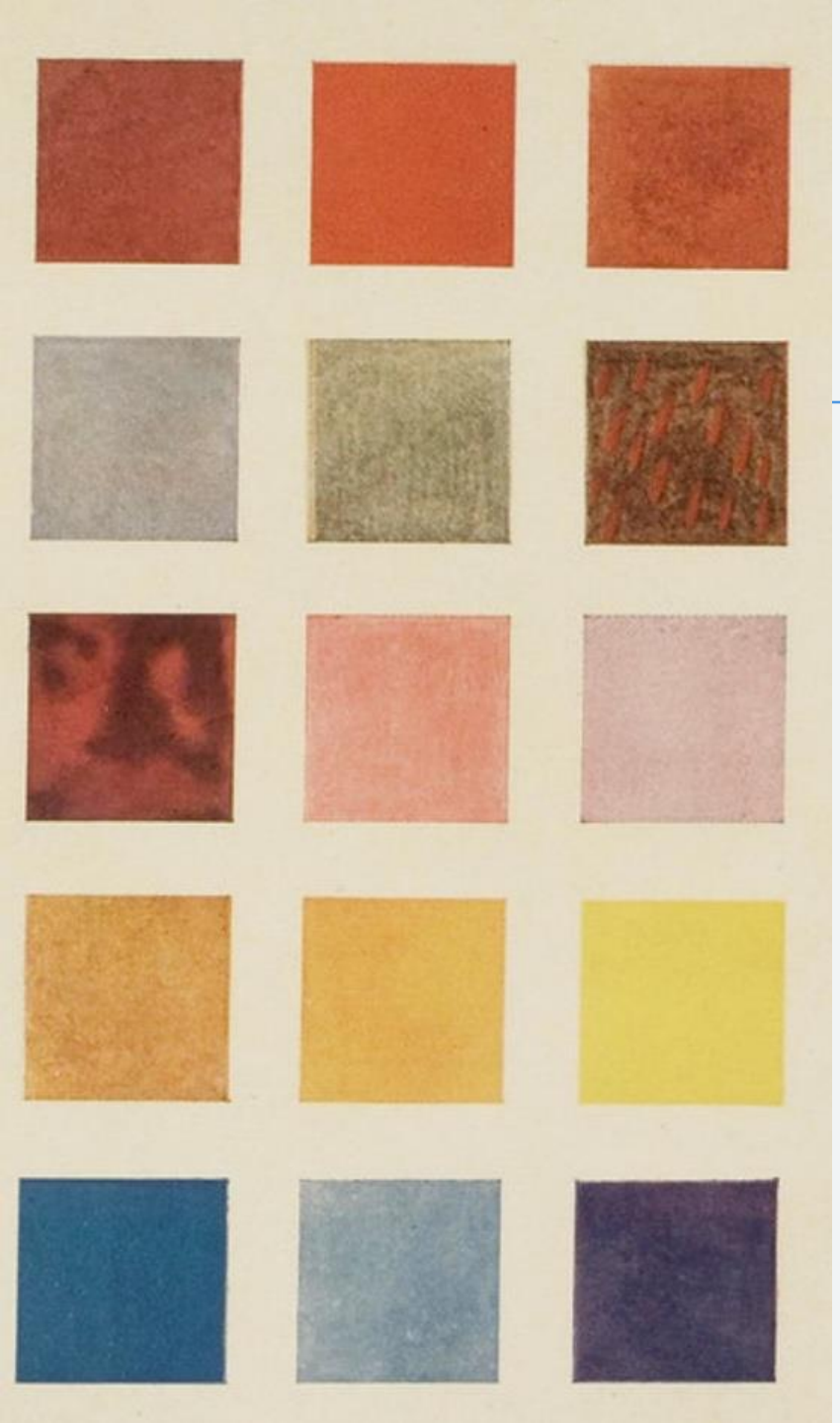
Users must be able to navigate and interact with the data visualizations

Understandable

Information and the interface must be clear and comprehensible

Robust

Your content must be usable by the widest number of people across the most technologies



Perceivable

Color, Contrast, and Visual Alternatives

Color

Choose a colorblind friendly palette

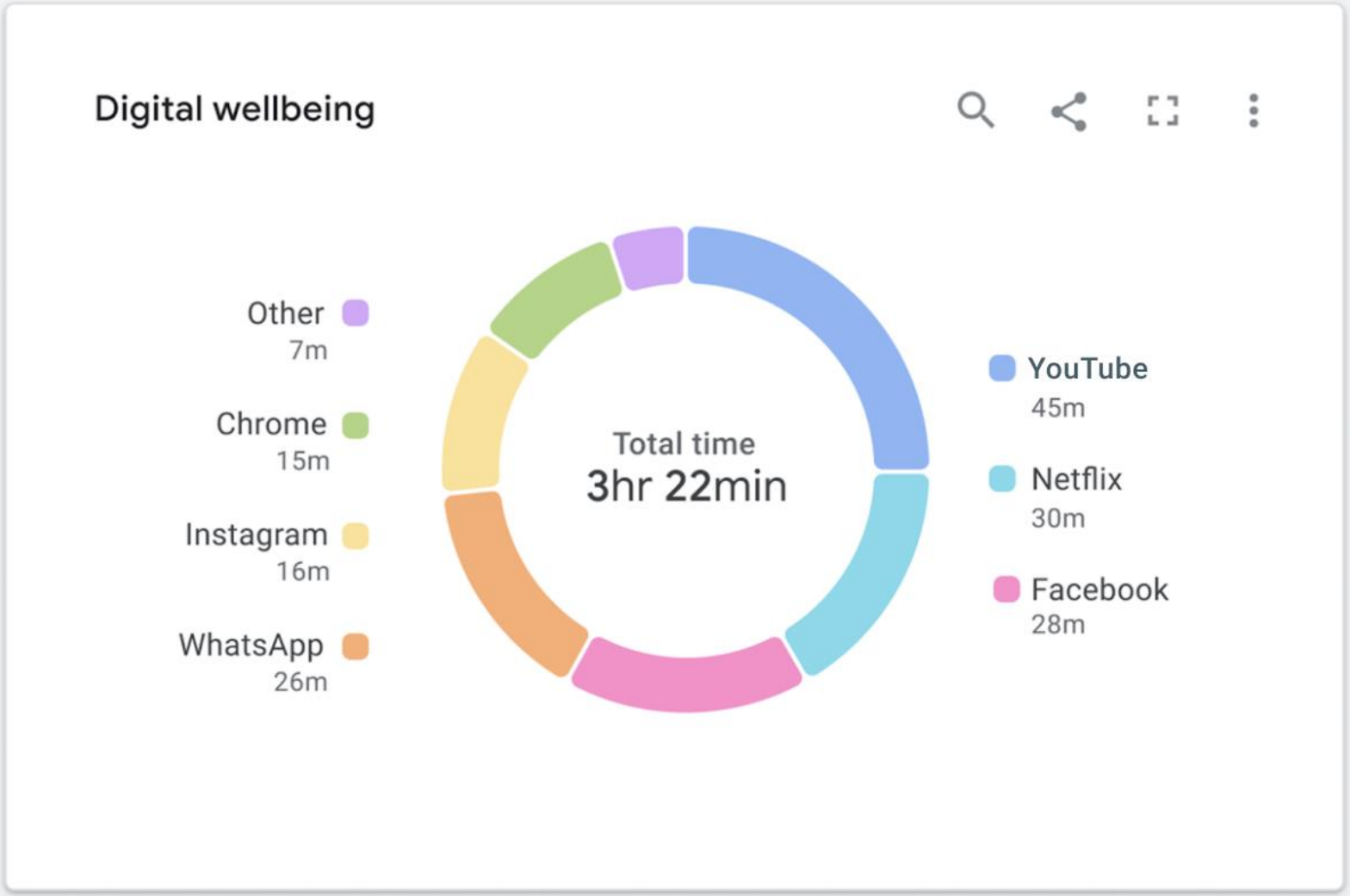


Chart: https://www.smashingmagazine.com/2024/02/accessibility-standards-empower-better-chart-visual-design/

Color

Choose a colorblind friendly palette

Protanopia: Red-Green Colorblindness

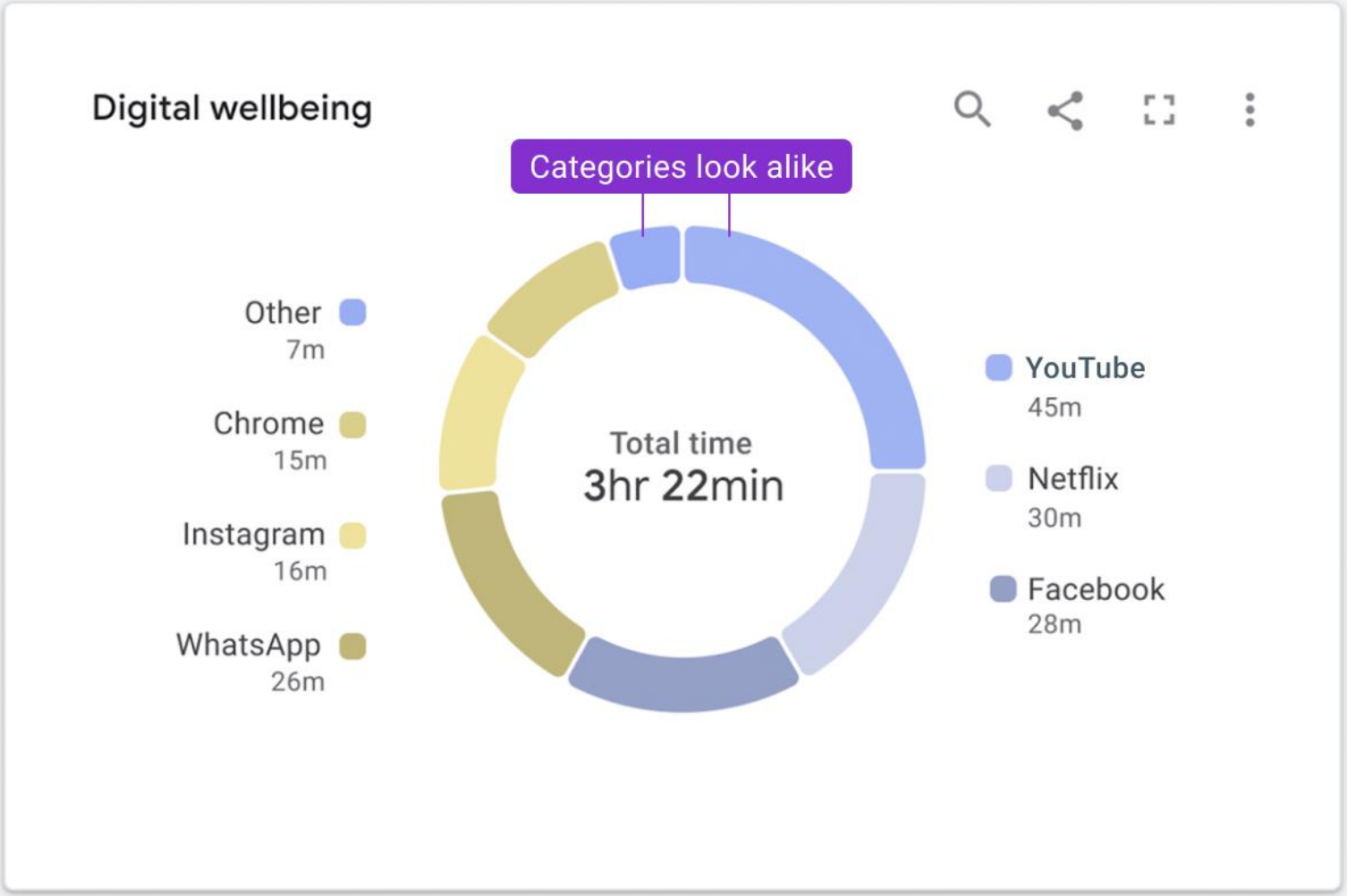
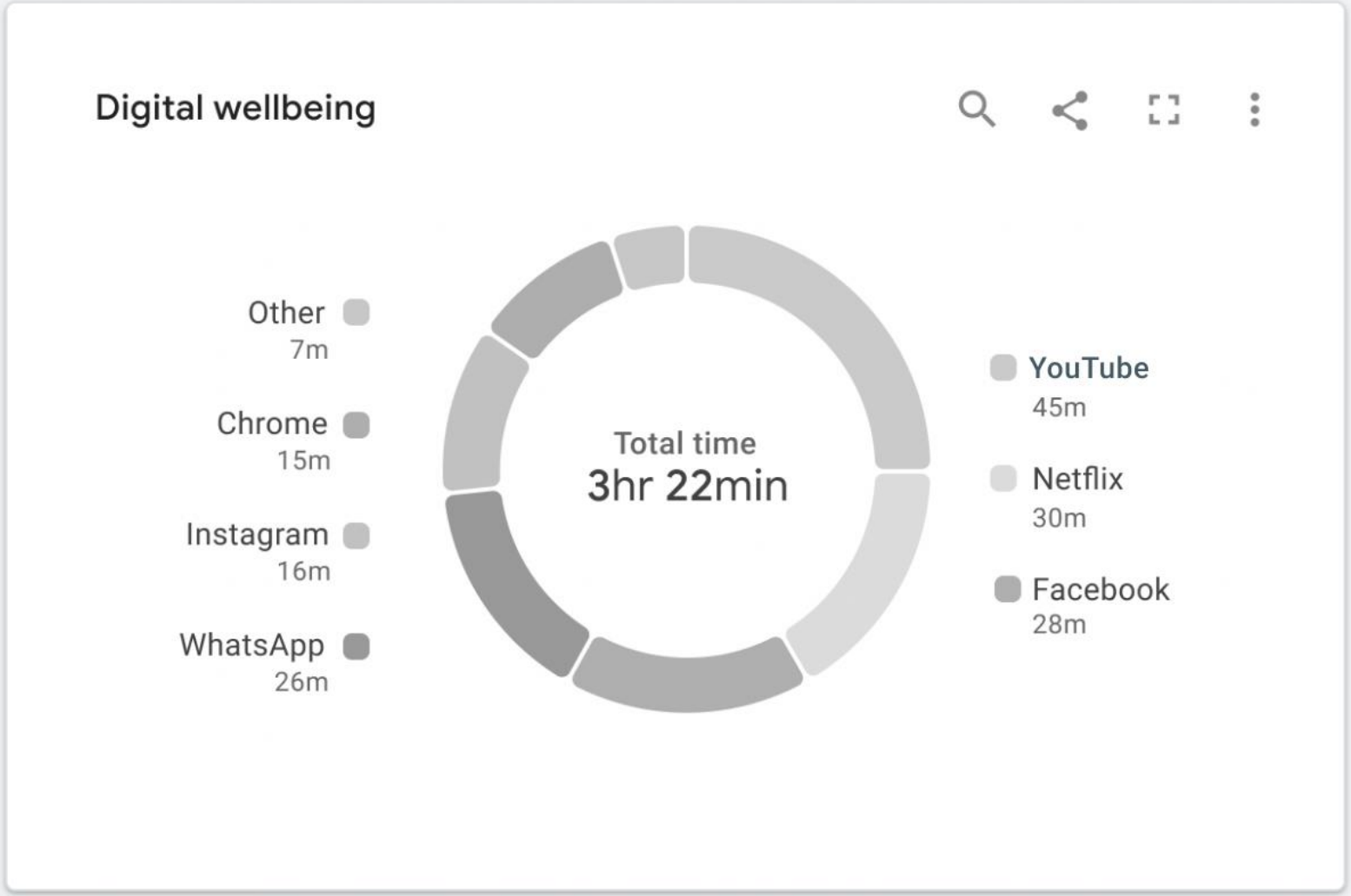


Chart: https://www.smashingmagazine.com/2024/02/accessibility-standards-empower-better-chart-visual-design/

Color

Choose a colorblind friendly palette

Achromatopsia: Absence of color vision



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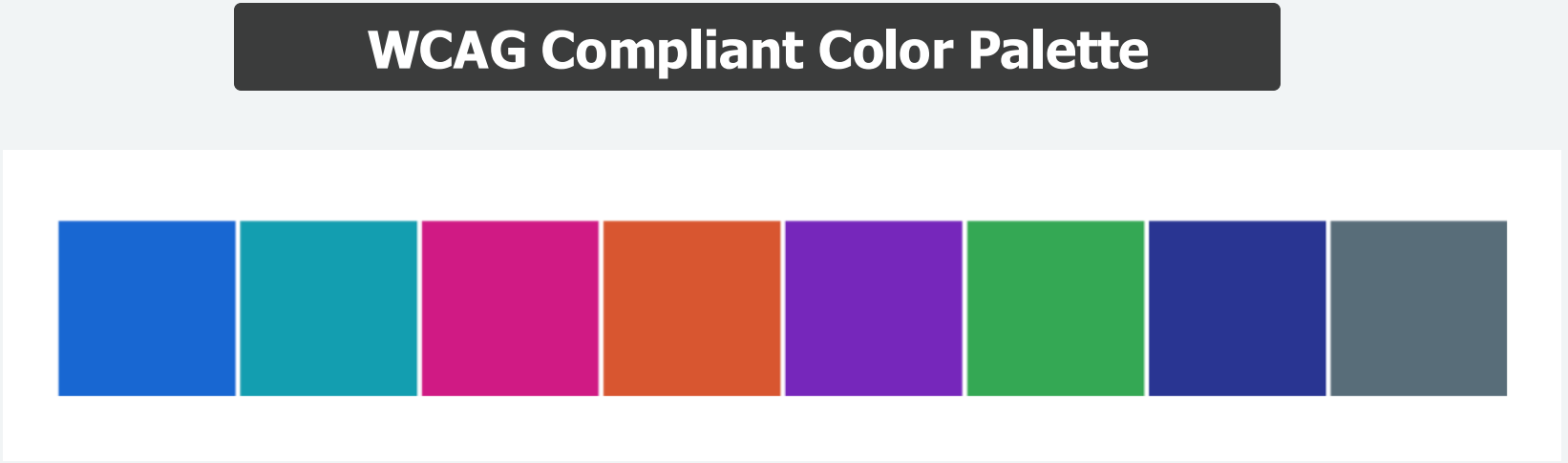

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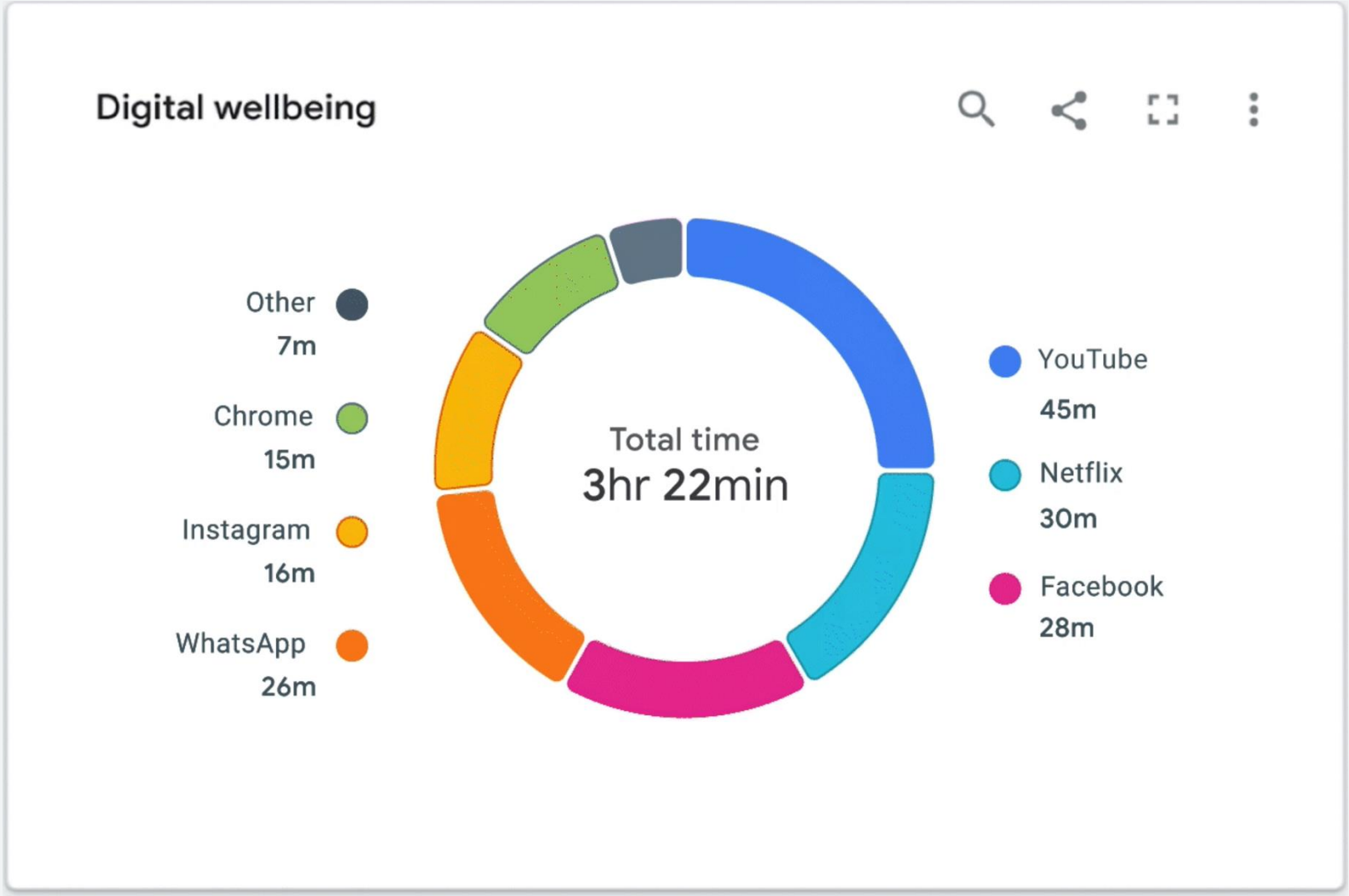
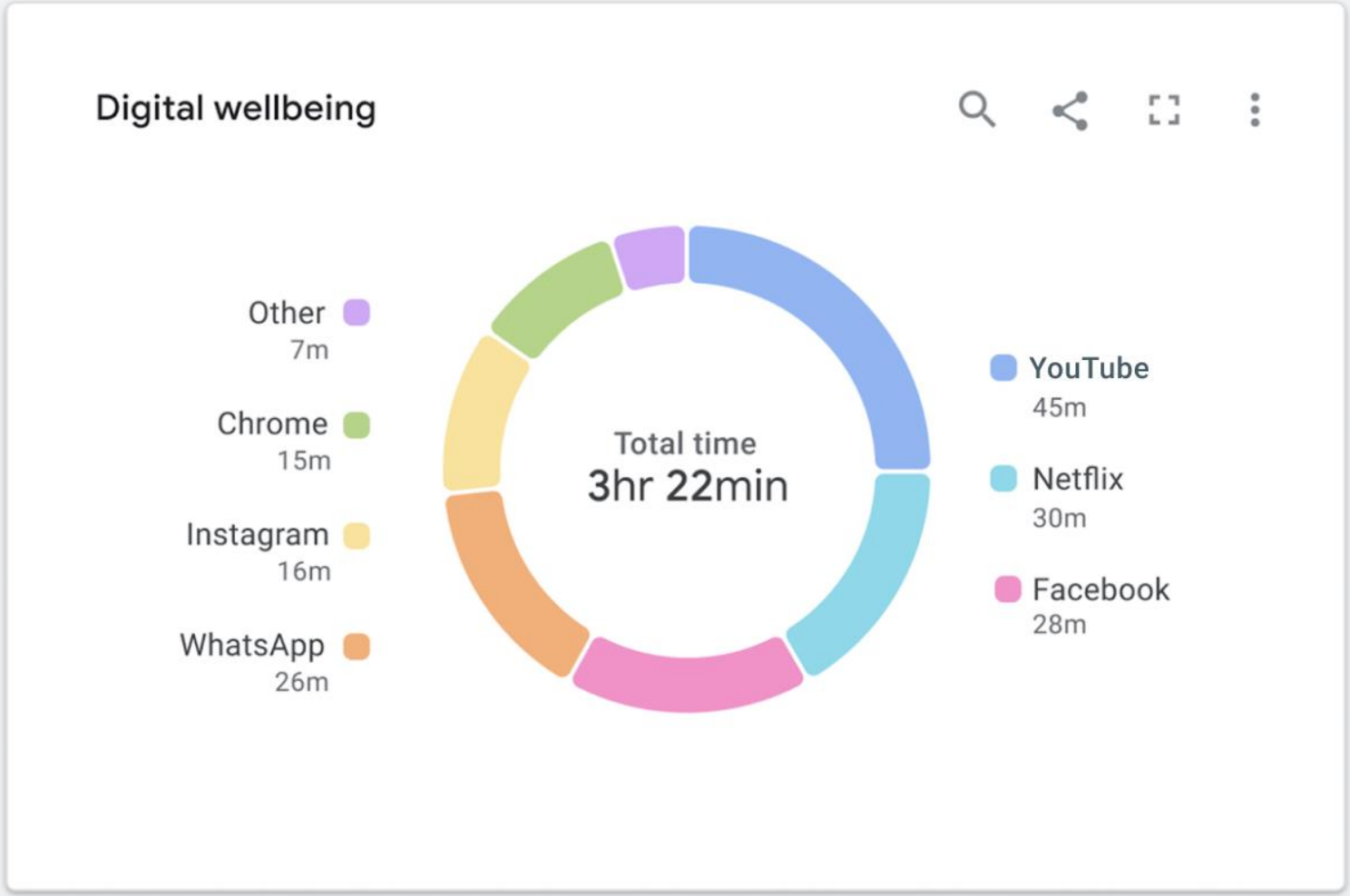


Chart: https://www.smashingmagazine.com/2024/02/accessibility-standards-empower-better-chart-visual-design/

Contrast

Text elements should have a **4.5:1 contrast ratio** with their background

Chart elements should have a **3:1 contrast ratio** with their neighboring elements



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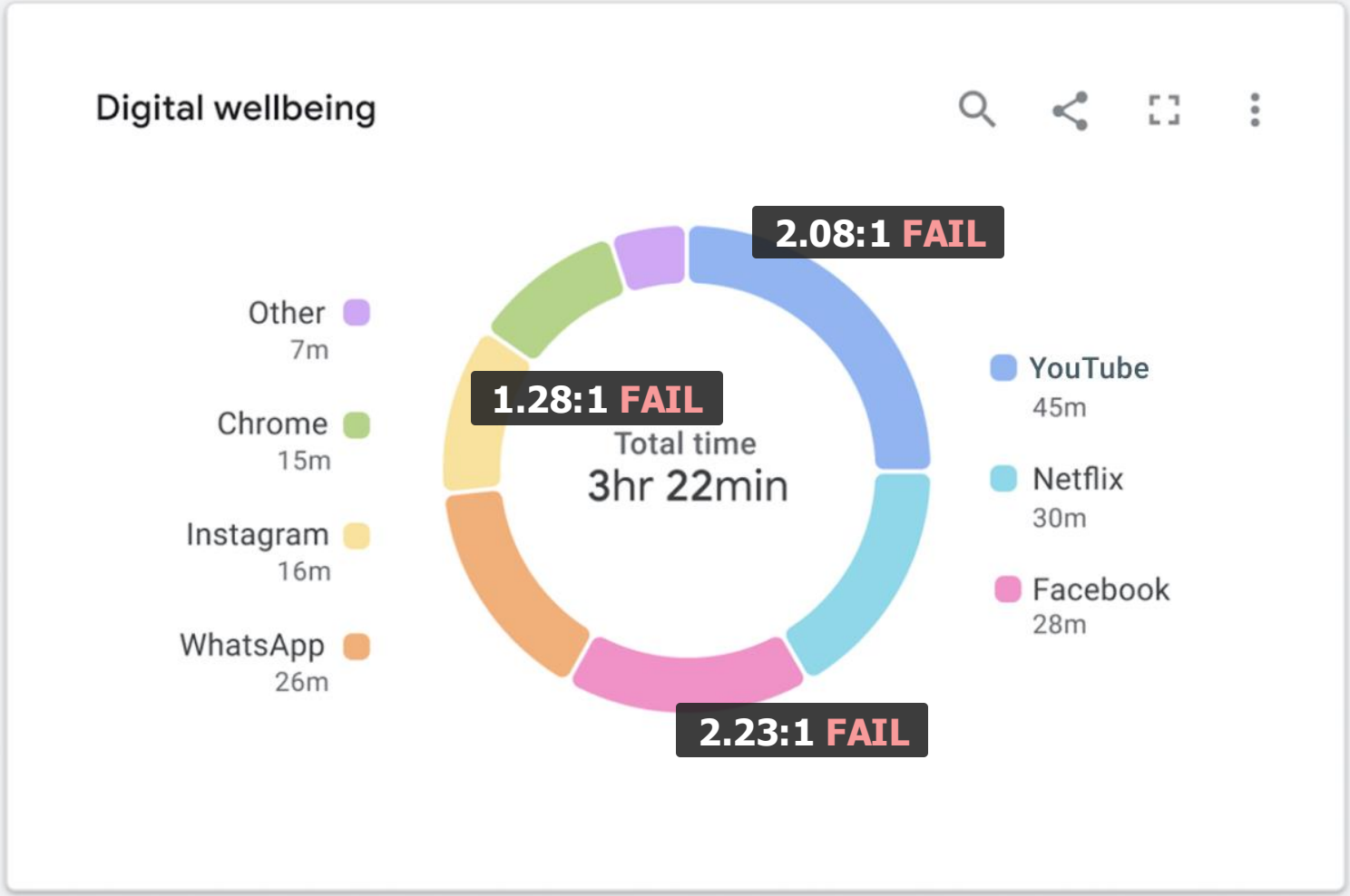

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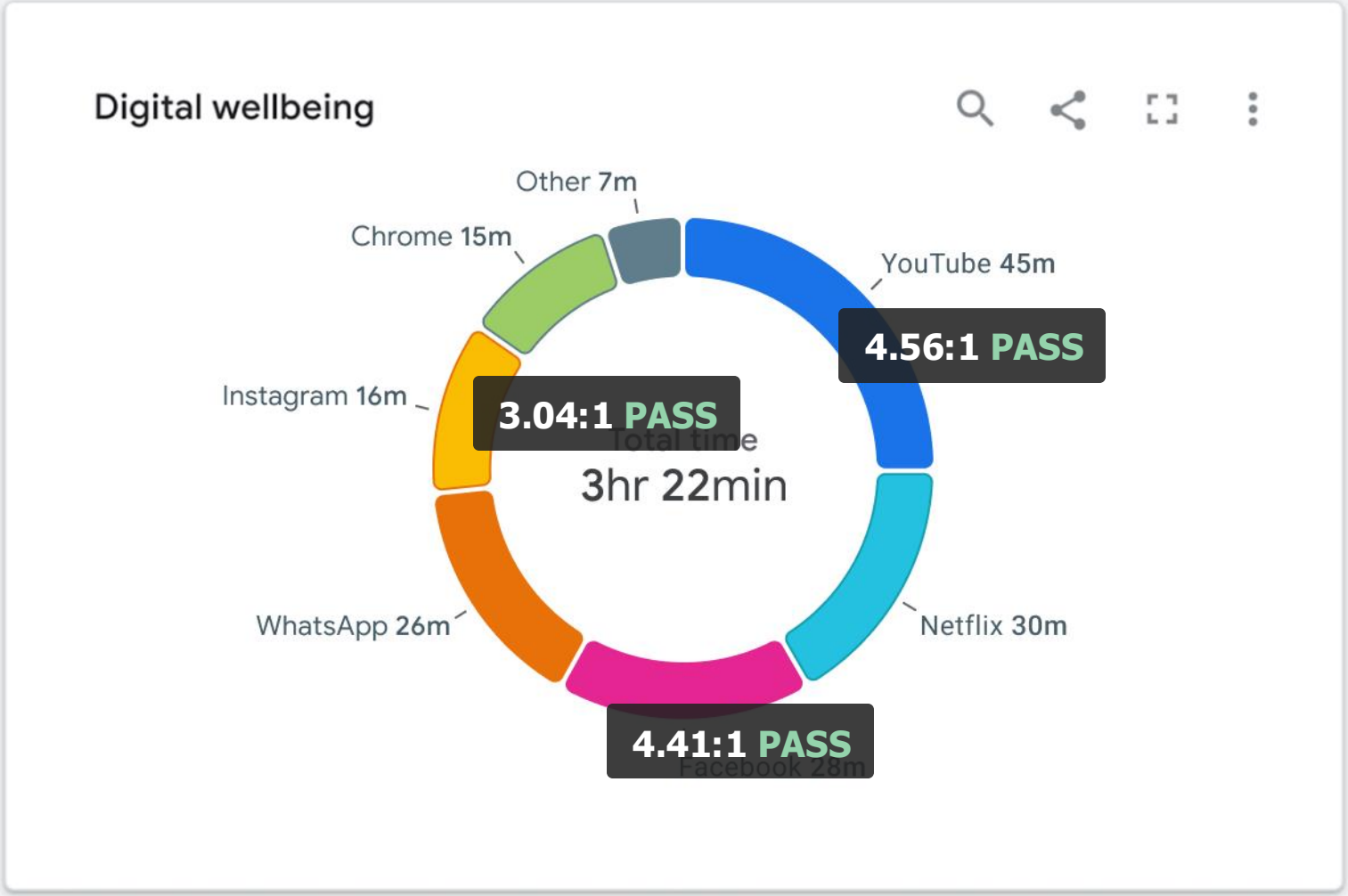
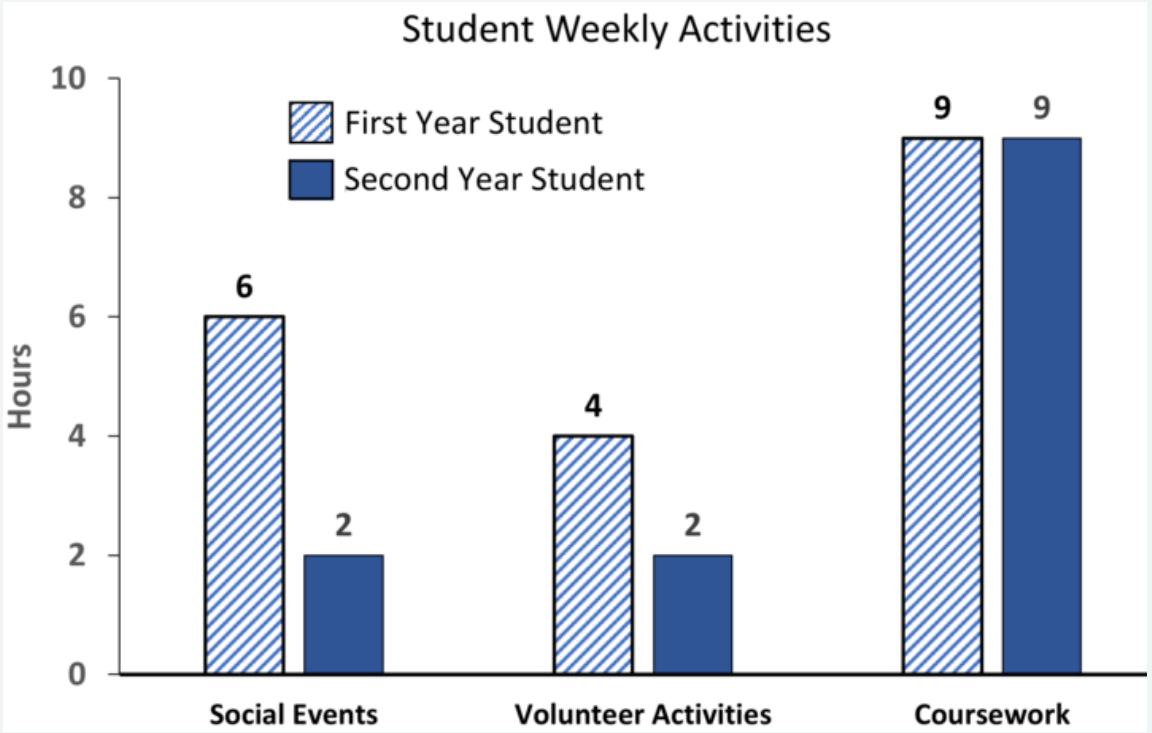


Chart: https://www.smashingmagazine.com/2024/02/accessibility-standards-empower-better-chart-visual-design/

Alternative (alt) Text

Short description
Briefly identifies the visualization in the alt text field, highlighting the important takeaway from the visualization

Long description
Contains the "essential information conveyed by the image", often presented as a data table or nearby text



Source: https://accessibility.huit.harvard.edu/data-viz-charts-graphs

Alternative (alt) Text

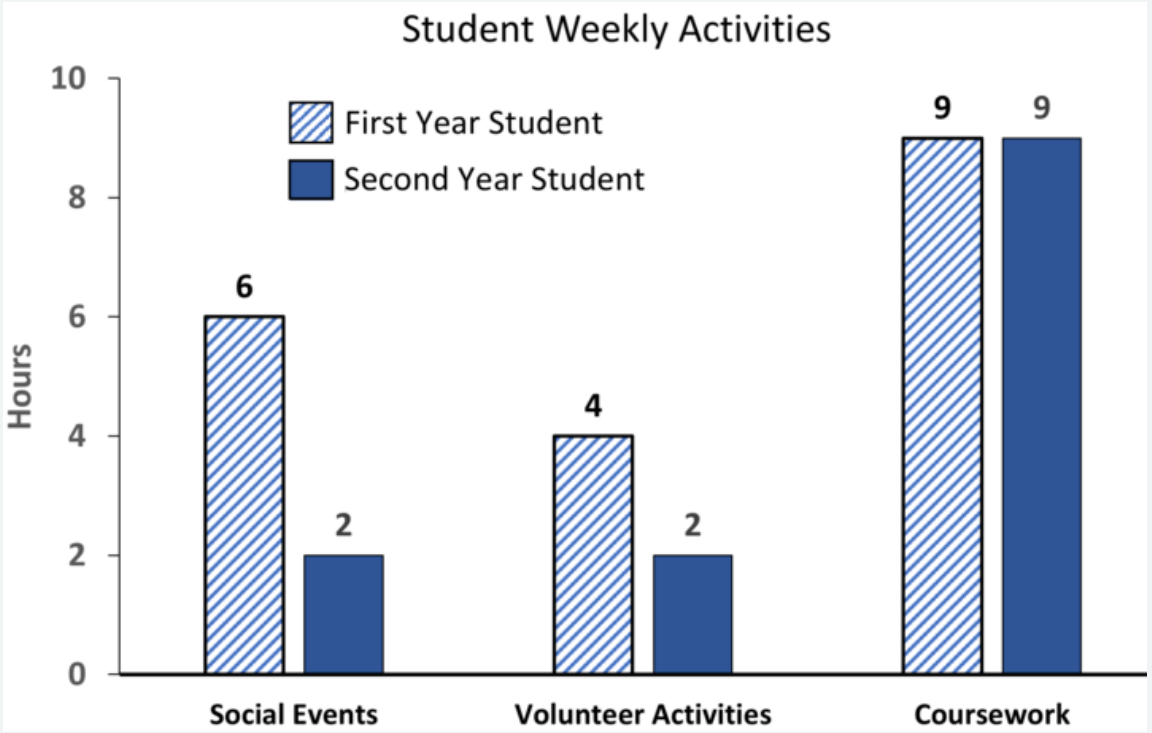
Short description

Bar chart showing weekly hours spent by first and second-year students on social events, volunteer activities, and coursework. For first and second-year students most time was spent on coursework.

Long description

Weekly activities for 1st and 2nd year students measured in hours.

- Social Events - First Year 6 hours, Second Year 2 hours.
- Volunteer Activities - First Year 4 hours, Second Year 2 hours.
- Coursework - First Year 9 hours, Second Year 9 hours.



Source: https://accessibility.huit.harvard.edu/data-viz-charts-graphs

Typography

- Use sans serif fonts
- Use sentence case, Not Title Case
- Use only one typeface, don’t mix and match

Source: https://accessibe.com/blog/knowledgebase/ada-compliant-fonts

Understandable

Simple, uncluttered visualizations with color alternatives

Direct Labeling

Display categorical information in **more than one** way

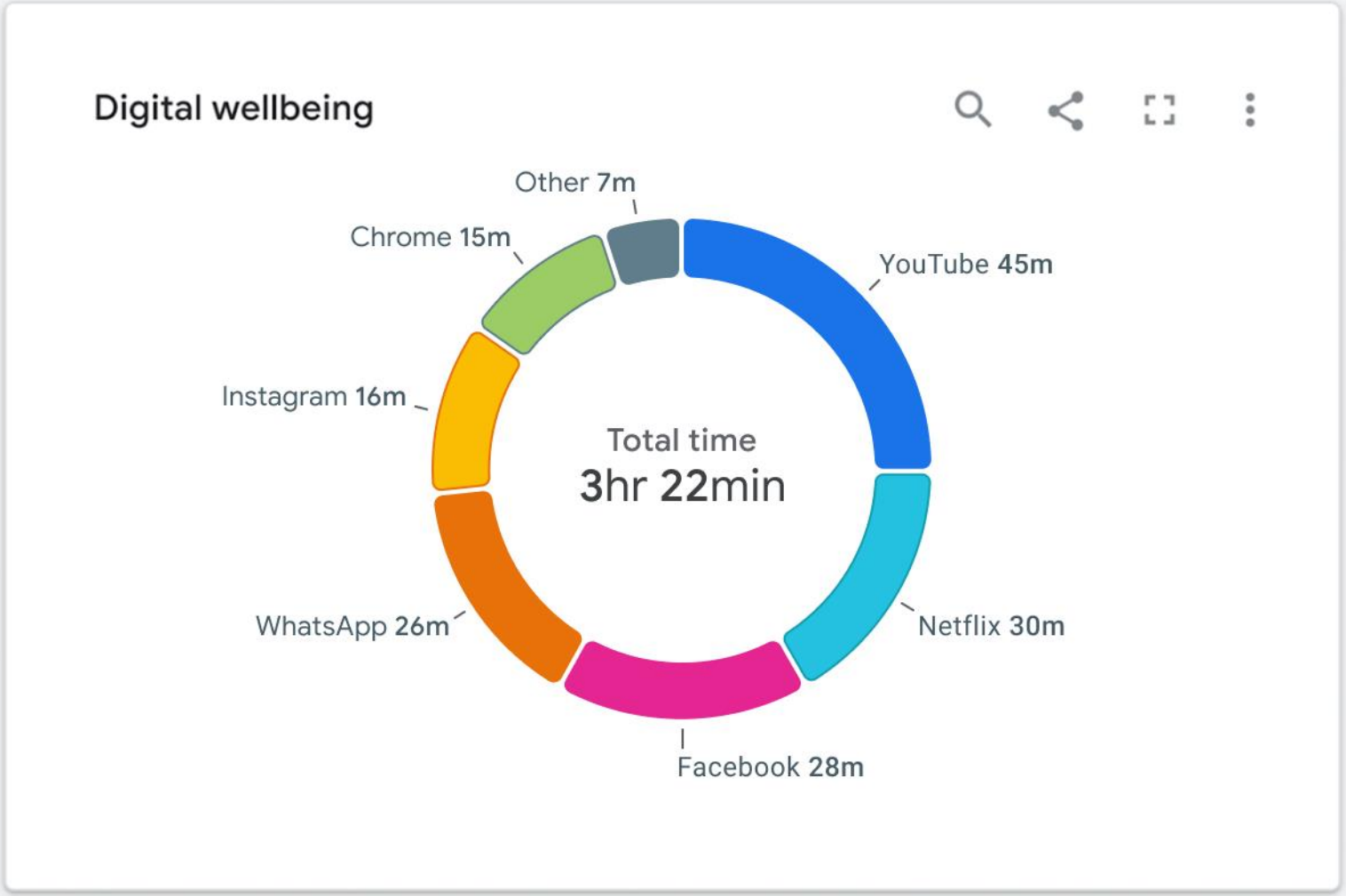
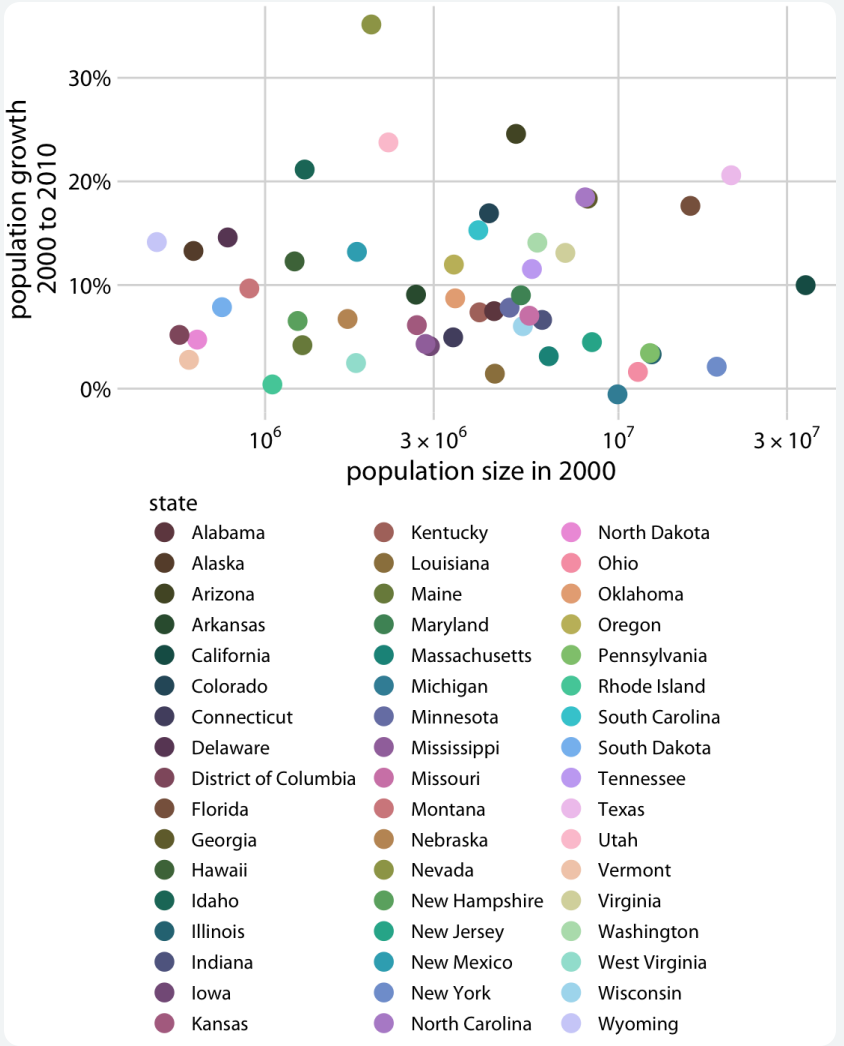


Chart: https://www.smashingmagazine.com/2024/02/accessibility-standards-empower-better-chart-visual-design/

Don’t overuse color

Qualitative color scales work best when there **are three to five** categories that need to be colored



Source: https://clauswilke.com/dataviz/color-pitfalls.html

Aggregate when reasonable

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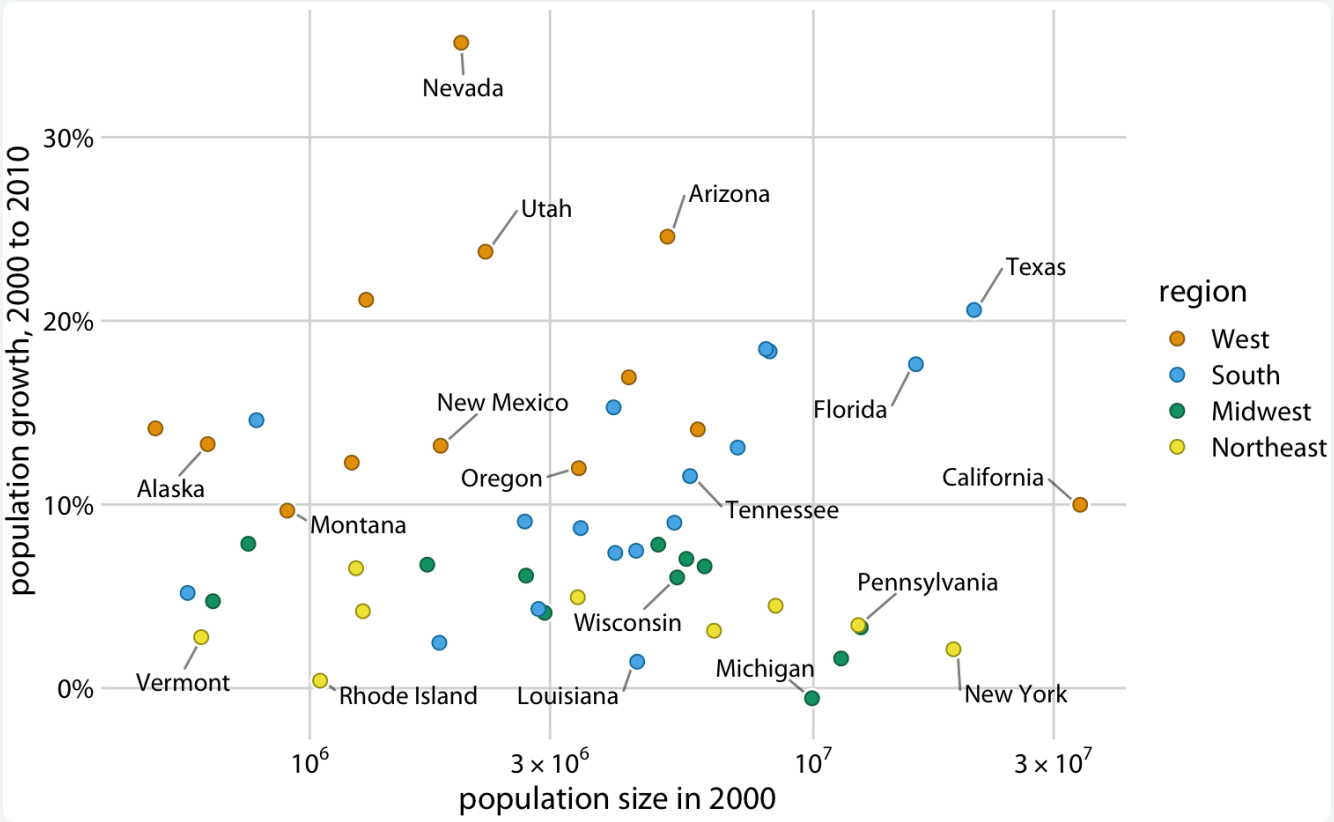
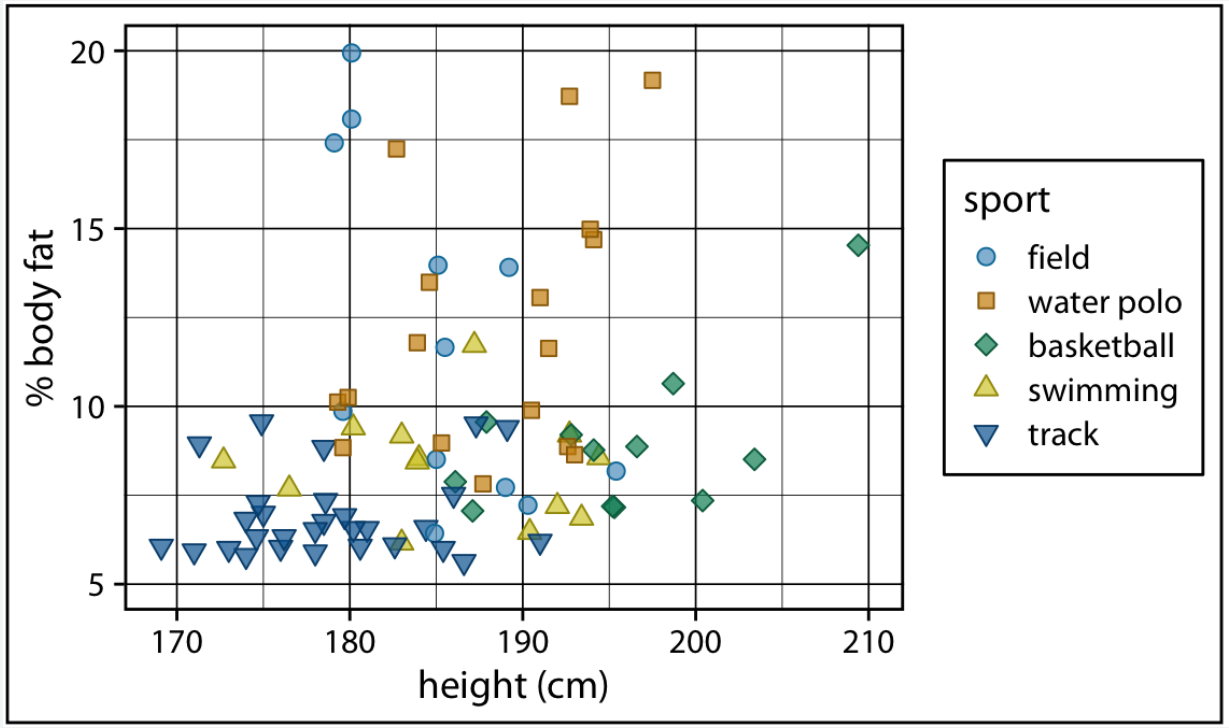


Source: https://clauswilke.com/dataviz/color-pitfalls.html

Remove "Chart Junk"

Elements that are not encoding information or providing context should be removed



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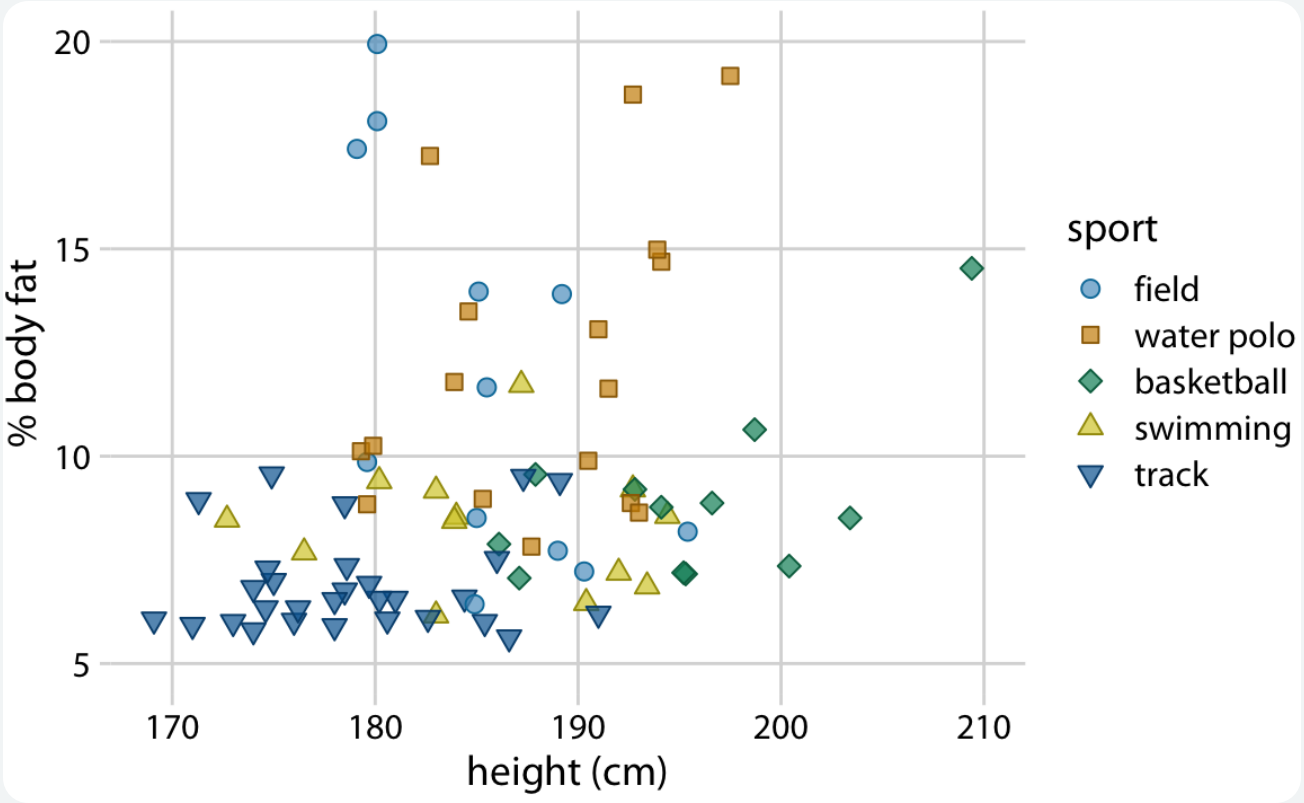

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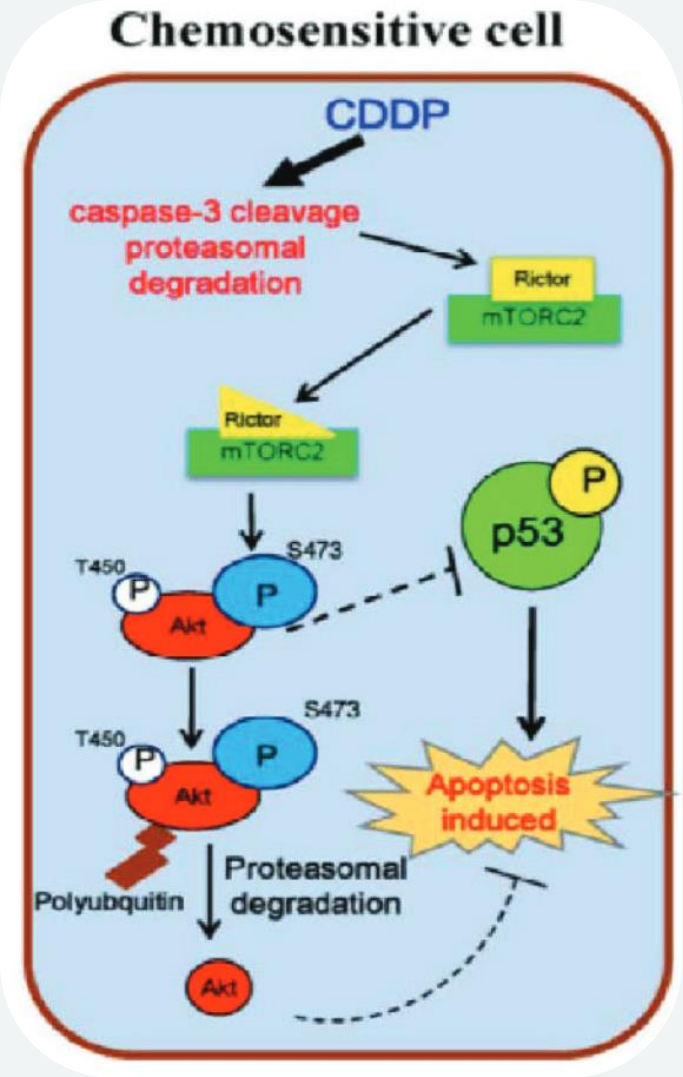
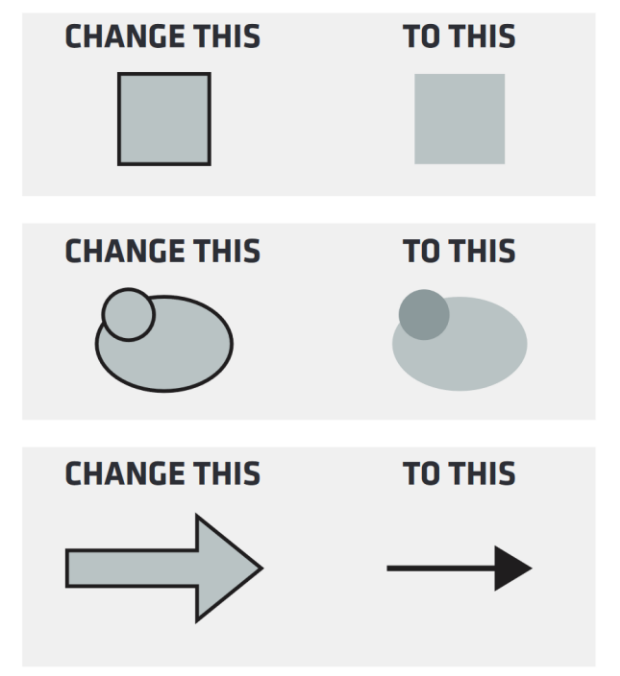
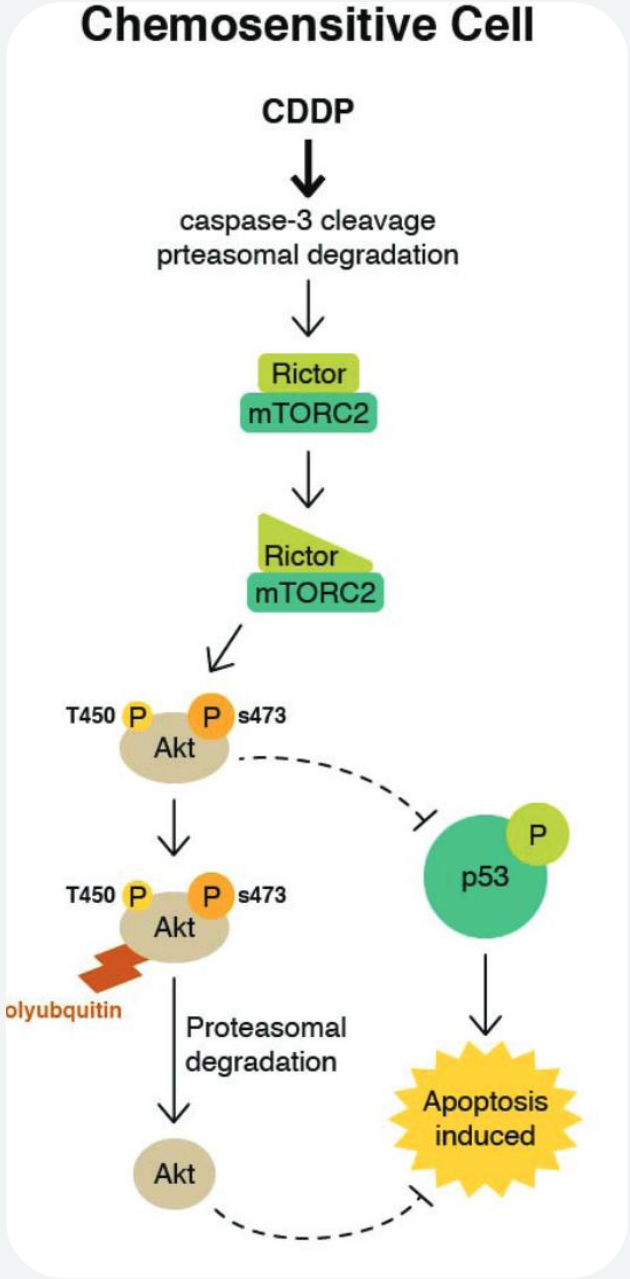
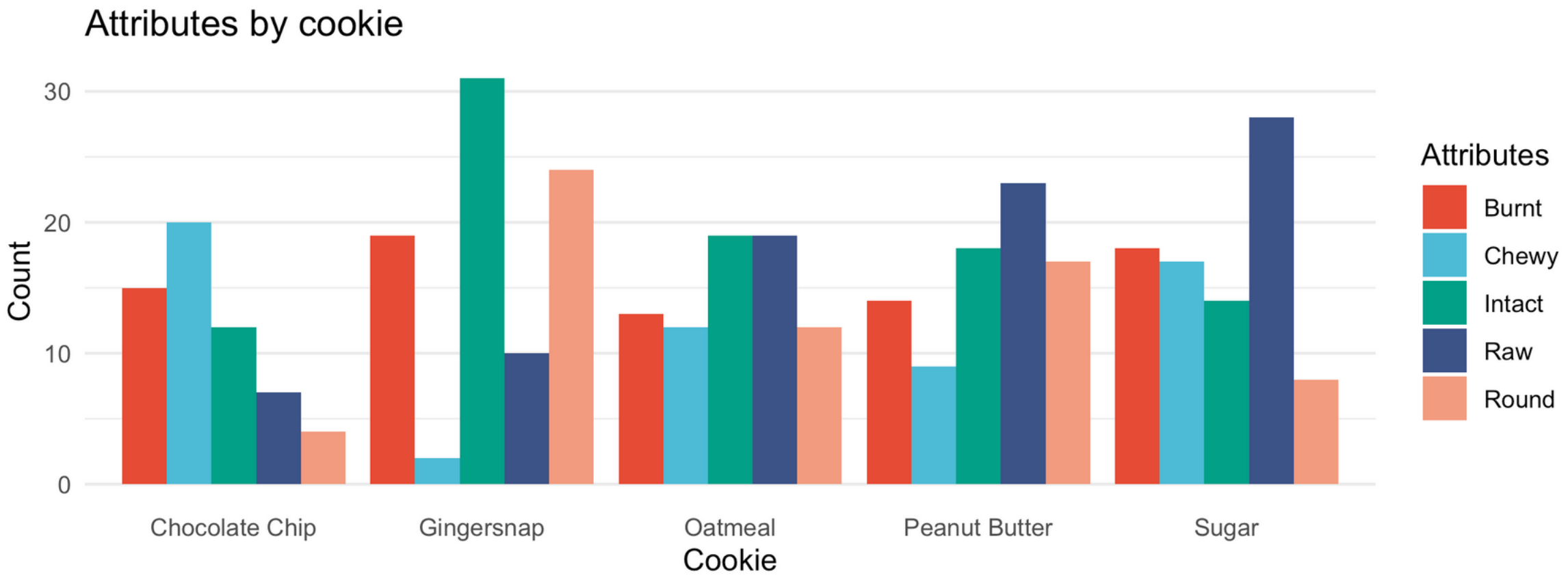






Source: https://cns.utexas.edu/images/CNS/Deans_Office/Communications/Files/design-tips-for-scientists_GUIDE.pdf

Use small multiples for complex plots



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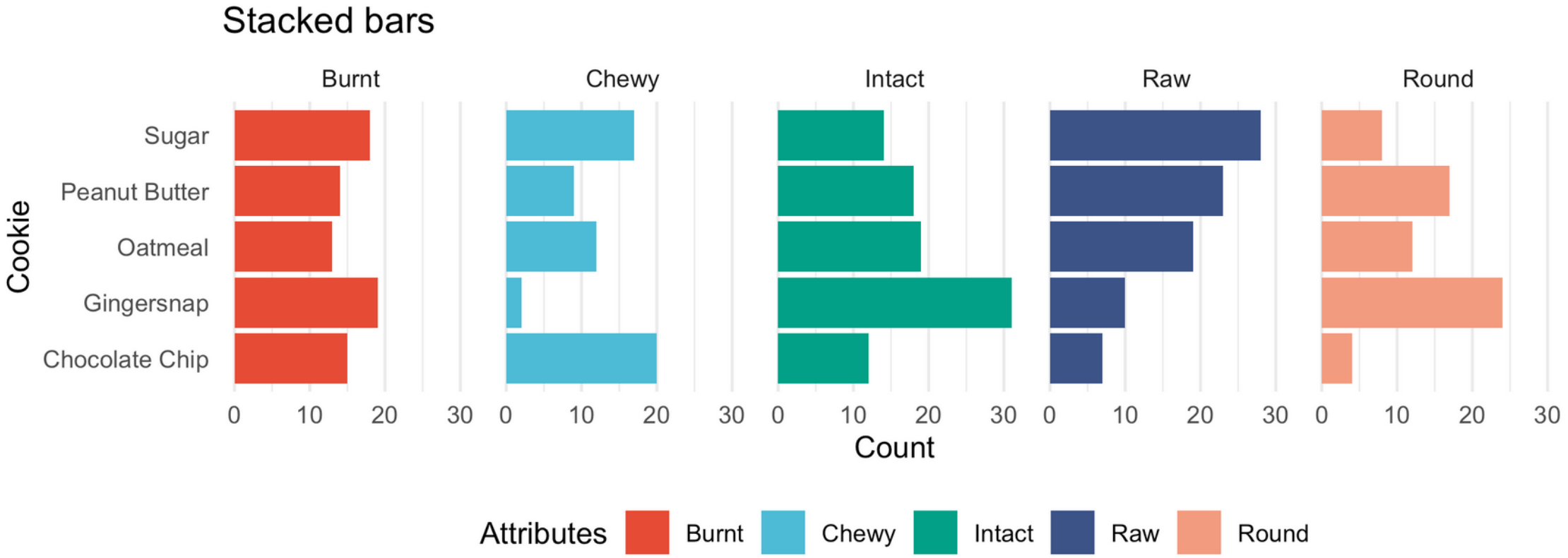
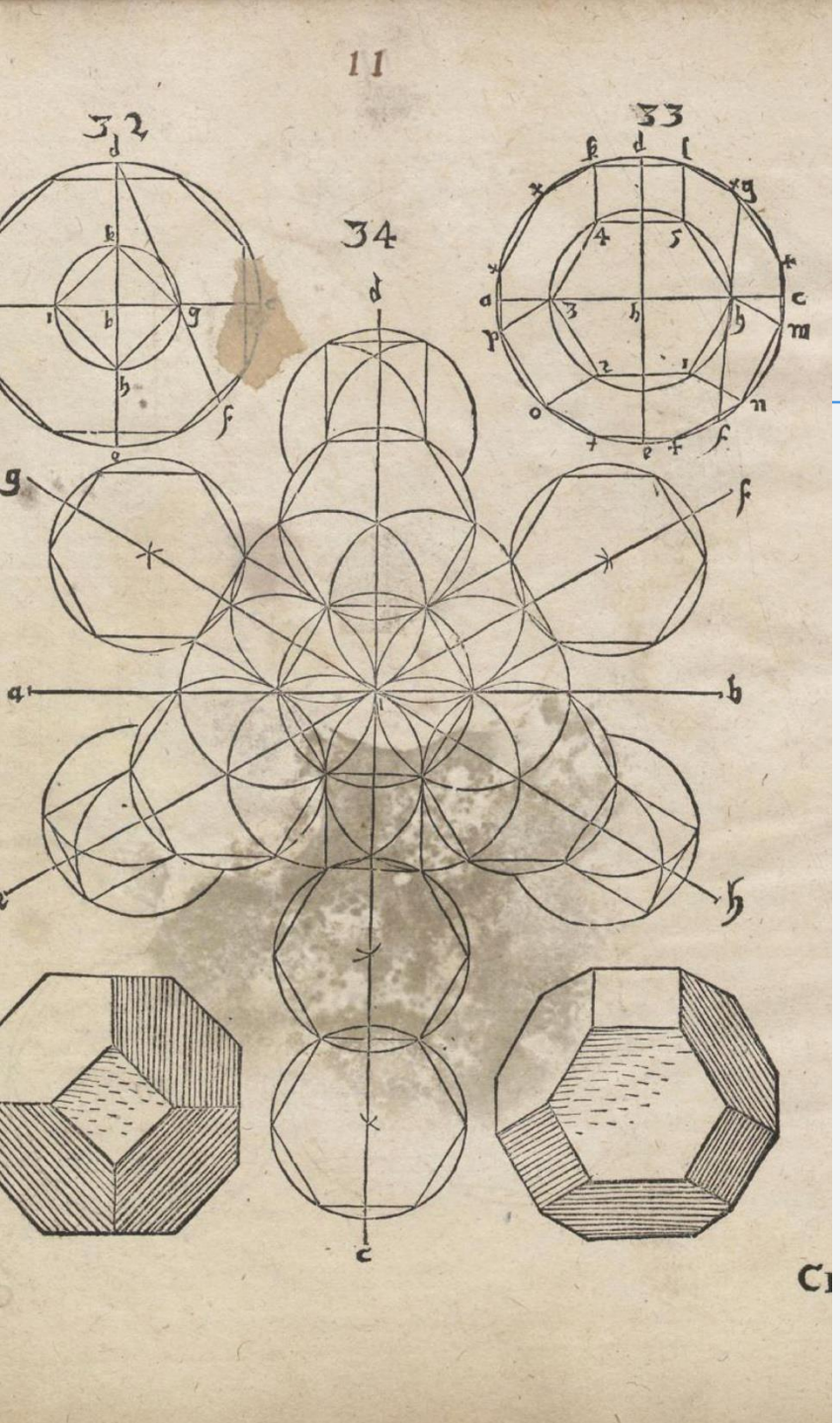




Operable

Accessible interactive visualizations

Tableau/Power BI

- Use descriptive links, titles and headings
- Use simple language tailored to your audience
- Each visualization should have a title, a caption, and a corresponding data table
- Tooltips are not accessible via keyboard – ensure no important information is hidden behind a tooltip
- Ensure you pair color with labels or shapes (multiple encodings)
- Reduce the number of marks with filters, groupings, or facets
- Use the built in low-vision or accessibility color palette
- Check the tab order. Is it simple to navigate through the report with keyboard shortcuts?
- Are all bookmarks and filters accessible using keyboard shortcuts?

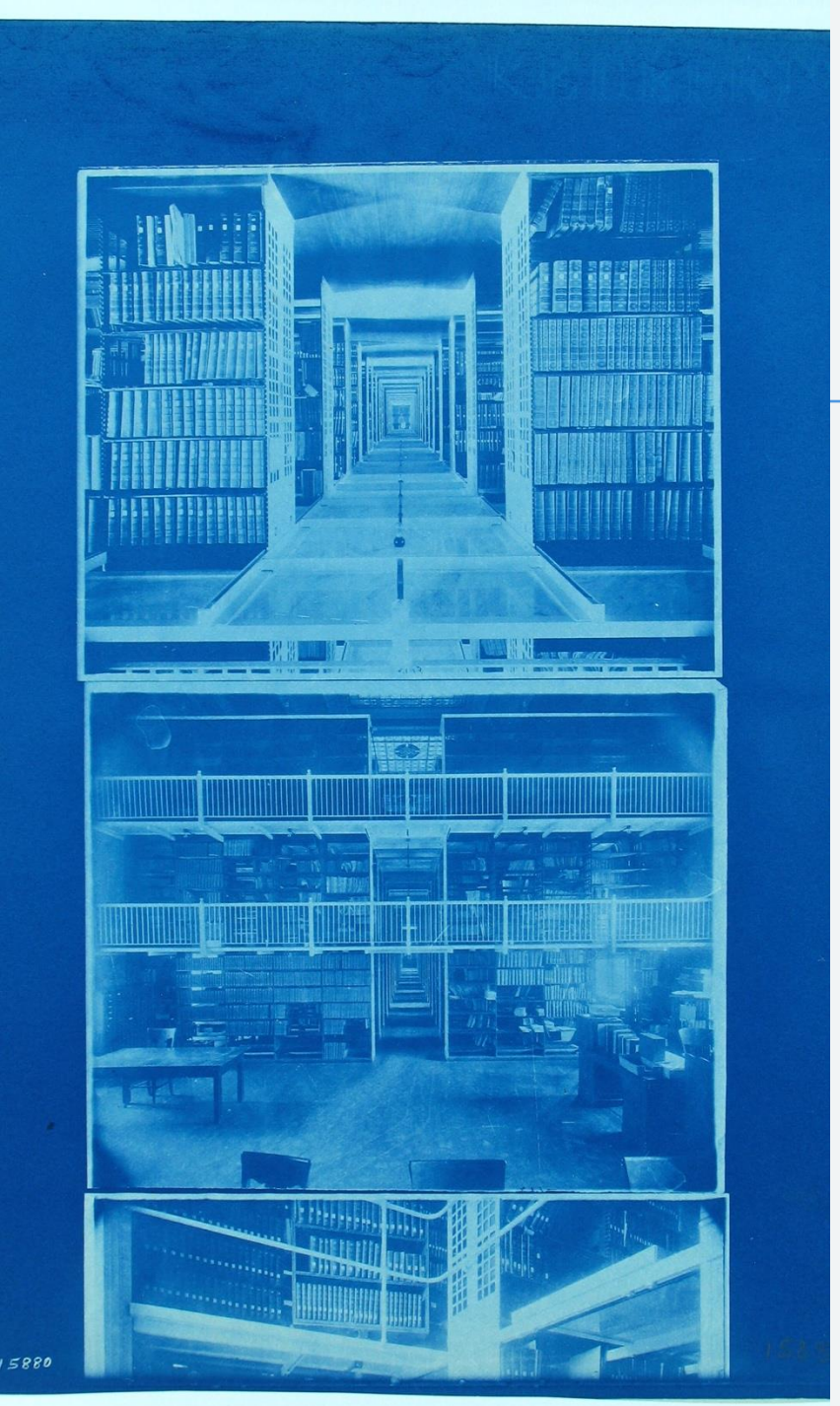
Tableau/Power BI

Tableau

- Best Practices for Designing Accessible Views
- Guide to Building Accessible Dashboards
- Build Accessible Data Visualizations in Tableau - Microcertification

Power BI

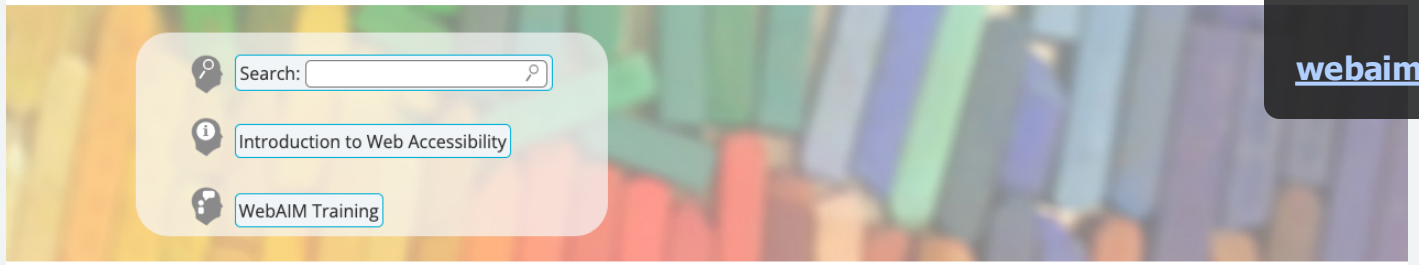
- Overview of accessibility in PowerBI
- Design Power BI reports for accessibility
- Microsoft Report Accessibilty Checklist



Resources

WebAIM

webaim.org/resources/contrastchecker/



Contrast Checker

Home > Resources > Contrast Checker

Foreground

Hex Value
0000FF

Color Picker

Alpha
1

Lightness

Background

Hex Value
FFFFFF

Color Picker

Lightness

Contrast Ratio
8.59:1

permalink

Related Resources

- Contrast and Color Accessibility
- Quick Reference: Testing Web Content for Accessibility
- WebAIM Auditing & Evaluation Services
- Web Accessibility for Designers
- Link Contrast Checker
- Contrast Checker Bookmarklet

Normal Text

WCAG AA: Pass
WCAG AAA: Pass

The five boxing wizards jump quickly.

Large Text

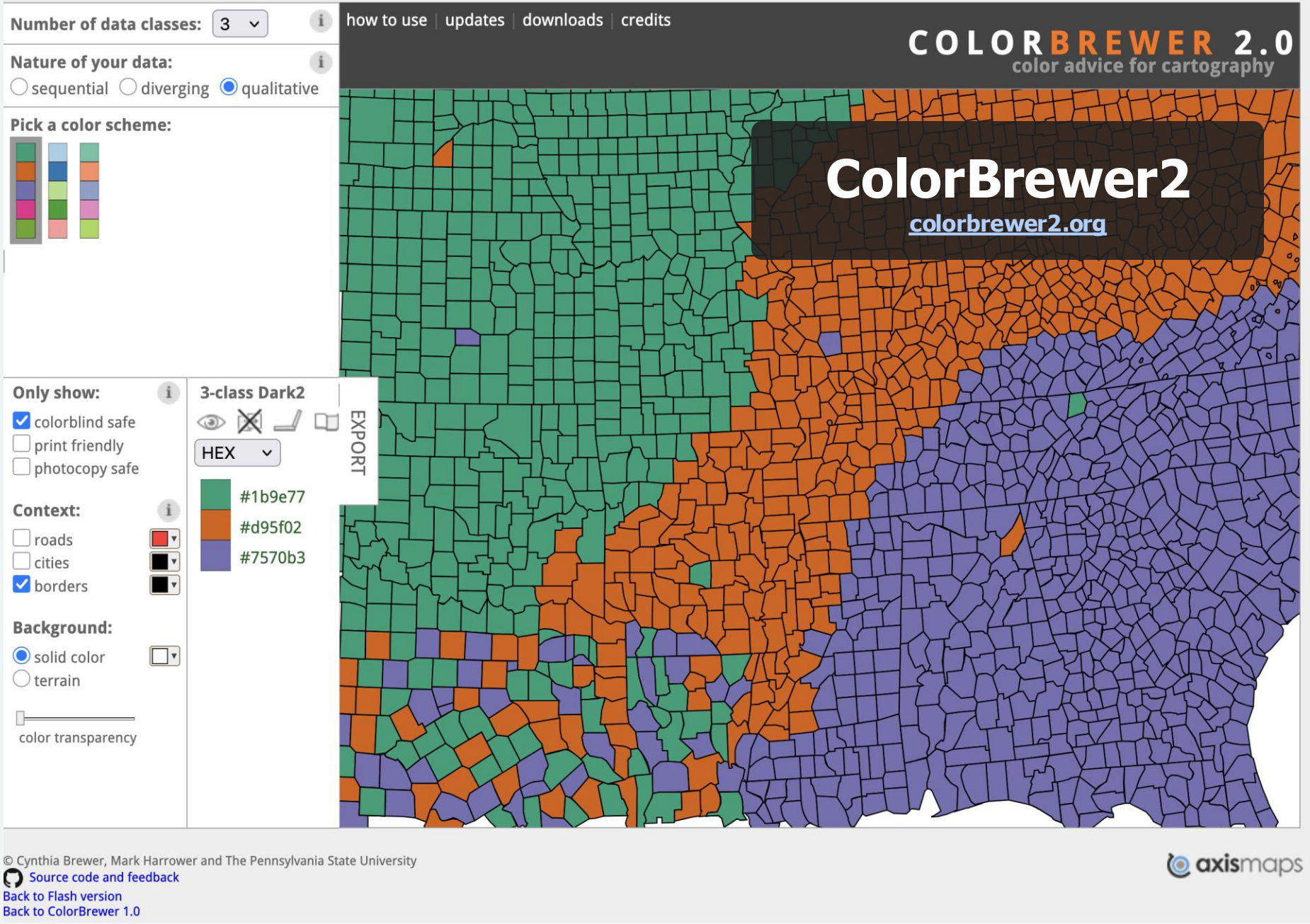
WCAG AA: Pass
WCAG AAA: Pass

The five boxing wizards jump quickly.

Graphical Objects and User Interface Components

WCAG AA: Pass

★
Text Input


Number of data classes: 3
Nature of your data:
sequential diverging qualitative
Pick a color scheme:
how to use | updates | downloads | credits
COLORBREWER 2.0
color advice for cartography
ColorBrewer2
colorbrewer2.org
Only show:
colorblind safe
print friendly
photocopy safe
Context:
roads
cities
borders
Background:
solid color
terrain
color transparency
3-class Dark2
EXPORT
HEX
#1b9e77
#d95f02
#7570b3
© Cynthia Brewer, Mark Harrower and The Pennsylvania State University
Source code and feedback
Back to Flash version
Back to ColorBrewer 1.0
axismaps

Coblis

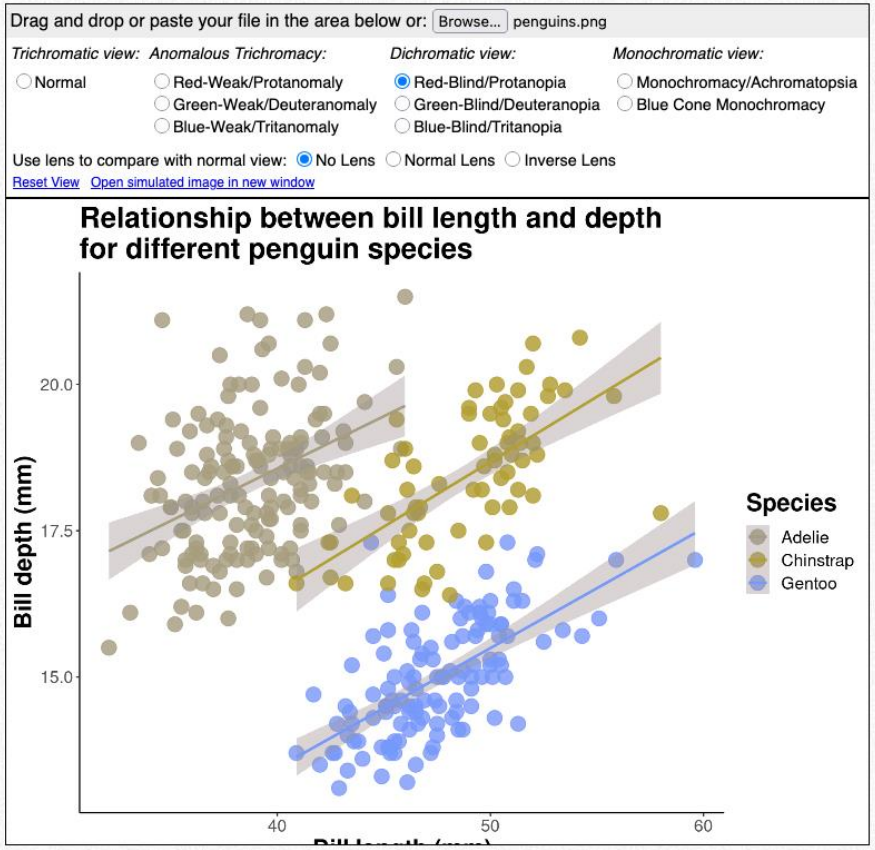
color-blindness.com/coblis-color-blindness-simulator/

Coblis — Color Blindness Simulator

If you are not suffering from a color vision deficiency it is very hard to imagine how it looks like to be colorblind. The **C**olor **BLI**ndness **S**imulator can close this gap for you. Just play around with it and get a feeling of how it is to have a color vision handicap.

As all the calculations are made on your local machine, no images are uploaded to the server. Therefore you can use images as big as you like, there are no restrictions. Be aware, there are some issues for the "Lens feature" on Edge and Internet Explorer. All others should support everything just fine.

So go ahead, choose an image through the upload functionality or just drag and drop your image in the center of our **C**olor **BLI**ndness **S**imulator. It is also possible to zoom and move your images around using your mouse – try it out, I hope you like it.



Search

FREE Color Blind Check

New kind of color blindness test! Try Color Blind Check and test type and severity of your color vision deficiency. Easy and fun!
Info at www.colorblindcheck.com

ANDROID APP ON Google play

CVD Categories

Academic Animals Children News People Pics Professions Publications Stories Tests Thoughts Tools Web

Recent Articles

- New Release of Color Blindness Simulator
- Color Blind Check released!!
- "Life Without Color" – Film about Color Blindness
- Test Version of "Color Blind Check" Android App Available
- "Colourblind as all we are"

Archives

Select Month

WCAG Data Visualization Checklist

Perceivable

☐ Provide alternative text and data table for charts
☐ Use color-blind–friendly palettes and avoid color-only encoding
☐ Ensure sufficient contrast for text and graphical elements
☐ Include clear titles, axis labels, and legends

Understandable

☐ Use plain language and simple design
☐ Add captions, summaries, or annotations for context
☐ Clearly label all data points and visual elements
☐ Explain dynamic changes (e.g., filters, animations)

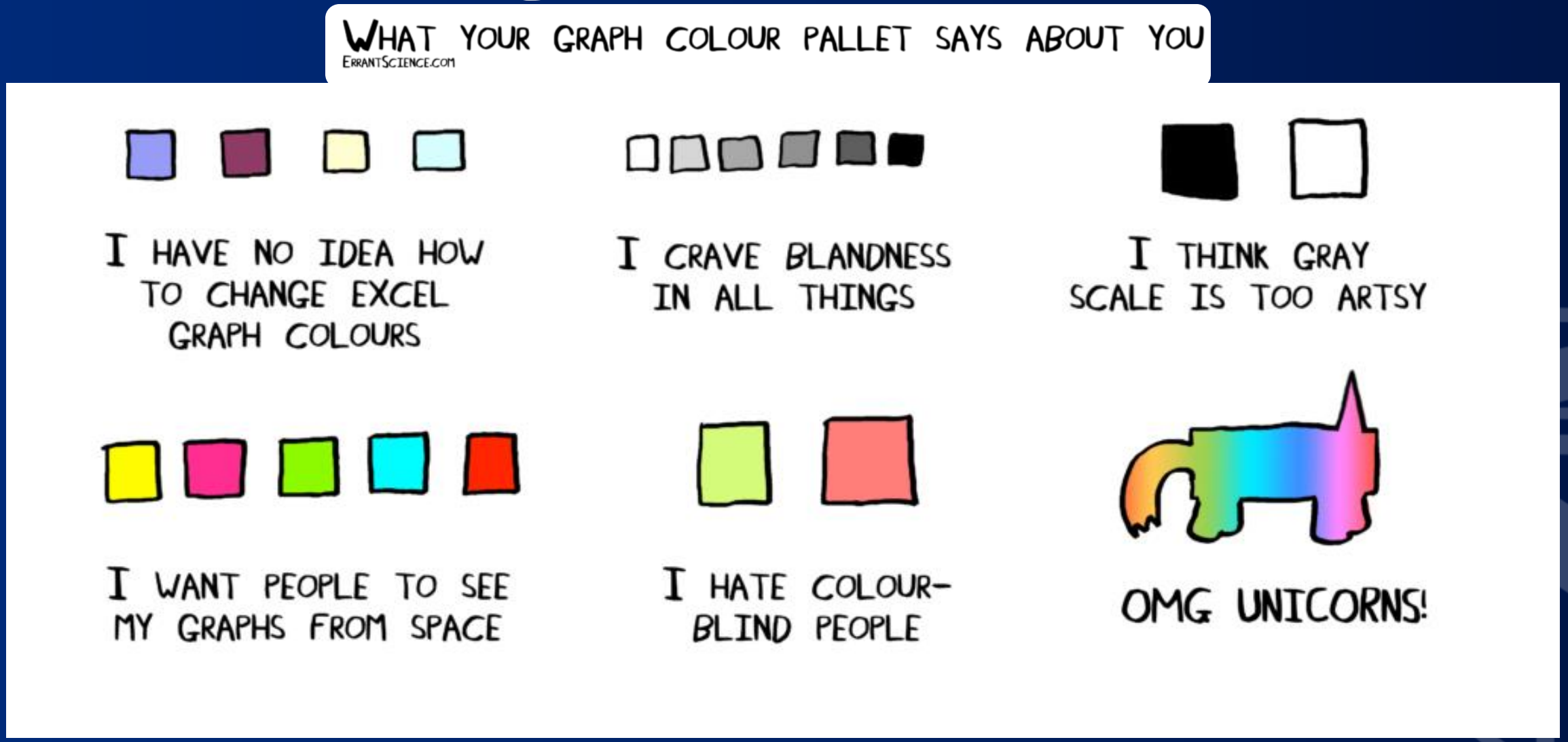
Operable

☐ Make interactive charts keyboard-navigable
☐ Avoid hover-only interactions—use click or focus alternatives
☐ Use ARIA roles for interactive elements
☐ Ensure controls and filters are accessible

Robust

☐ Use semantic HTML and accessible libraries
☐ Ensure SVGs and interactive elements work with screen readers
☐ Provide fallback formats (e.g., data tables or CSV download)
☐ Test visualizations with assistive technologies

Questions?


WHAT YOUR GRAPH COLOUR PALLET SAYS ABOUT YOU
ERRANTSCIENCE.COM
I HAVE NO IDEA HOW TO CHANGE EXCEL GRAPH COLOURS
I CRAVE BLANDNESS IN ALL THINGS
I THINK GRAY SCALE IS TOO ARTSY
I WANT PEOPLE TO SEE MY GRAPHS FROM SPACE
I HATE COLOUR-BLIND PEOPLE
OMG UNICORNS!